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(54) MICRO RANGE RF COMMUNICATIONS LINK

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LIAISON DE COMMUNICATION RF A TRES FAIBLE PORTEE

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Description

BACKGROUND OF THE INVENTION

Field of Invention

[0001] The invention relates to a communications link and more particularly to a micro range RF communications link between a moving device and at least one access point positioned along a predefined path of motion for the moving device.

Description of Related Art

[0002] Data communication between various parts or components of an industrial machine or between a plurality of industrial devices is integral to a control and management system for industrial manufacturing. As a result, the type of communications link becomes extremely important. Factors that are considered when selecting a type of communications link are data transmission rate, range, battery life, security, cost, quality of service, and interoperability.

[0003] One type of communications links is a wired cable. A cable is attached to each part(s) of the machine and to each machine to facilitate or enable communication. However, the use of cables causes a significant overhead for installation, maintenance and troubleshooting. For example, several of the machine parts are in a difficult location to attach a cable or replace the cable that requires a significant cost for the installation and maintenance. Additionally, as the machine is used, the cables become damaged and must be replaced. The machine(s) must be stopped to replace the cable, causing the manufacturing process to be halted. Further, network routing would require significant overhead and/or a separate device dedicated to control routing communication signals between devices. Additionally, even if only a small section of the cable is damaged, the entire cable will be replaced.

[0004] Another type of communications link is a standard wireless antenna. In the last few years, many wireless connectivity standards have emerged. These technologies enable users to connect a wide range of computing and telecommunications devices easily and simply, without the need to buy, carry, or connect cables. These devices have eliminated the need to purchase additional or proprietary cabling to connect individual devices, thus creating the possibility of using mobile data in a variety of applications. There are many standards such as Bluetooth, IrDA, Home RF, and IEEE 802.11.

[0005] However, the uncoordinated transmission of wireless signals leads to signal interference. The transmission of control information or data between various moving parts and a central base station requires a long range communications link. However, an industrial environment is very noisy and is rampant with interference by electromechanical devices in the area. Additionally, wireless devices transmitting RF signals in the same area contribute to transmission failures.

[0006] Accordingly, there is a need to provide a communications link that overcomes the problem of signal interference, reduces the cost and simplifies the maintenance for the communications link.

[0007] WO-A-00/65551, AU677939 and US-A-2002/038267 all disclose data transmission systems.

BRIEF SUMMARY OF THE INVENTION

[0008] The present invention provides a system as defined in claim 1.

[0009] The system may include the features of any one or more of dependent claims 2 to 8.

[0010] Applicant has developed a micro range RF communications link that is used to transmit data from a moving device to an access point or a receiver positioned along a fixed path of motion of the moving device. Each receiver includes a shield that can channel or funnel the transmitted data signal to the receiver to overcome the drawbacks of the prior art by eliminating any interference caused by overlapping radio signal.

[0011] Disclosed is a micro range RF data transmission system comprising at least one transmitter incorporated in a moving device, and at least one receiver positioned along a fixed path. The moving device moves along a fixed path. Each of the at least one receiver is positioned along the fixed path such that when the moving device moves along the fixed path and is positioned proximate to one of the at least one receiver, one of the at least one transmitter aligns with the one of the at least one receiver creating a data transfer point. When the one of the at least one transmitter is at the data transfer point, the one of the transmitters transmits a micro range signal to the one of the receivers.

[0012] The micro range RF data transmission system further includes at least one receiver incorporated into the moving device and at least one transmitter positioned along the fixed path. Each transmitter(s) is positioned along the fixed path such that when the at least one receiver in the moving device is proximate to each transmitter(s), each of the one of the at least one receiver in the moving device aligns with one of the at least one transmitter creating a reverse data transfer point. The data transfer point and the reverse data transfer point allow for a simultaneous bi-directional data transfer between the fixed path and the moving device.

[0013] Each transmitter in the micro range RF data transmission system transmits the micro range signal over a distance less than a predetermined value.

[0014] Each receiver in the micro range RF data transmission system includes an electromagnetic shield formed around a perimeter of each receiver. The electromagnetic shield acts as a chamber that channels the micro range signal from each transmitter to each receiver when a transmitter is at a data transfer point to avoid interference.

[0015] Each transmitter has a corresponding control section that includes an alignment sensor. The alignment sensor senses when each transmitter is proximate to a receiver. The alignment sensor outputs a control signal that allows the transmitter to transmit the micro range signal when the alignment sensor detects that the transmitter is proximate to a receiver and is at the data transfer point.

[0016] Also disclosed is a control system used for controlling an industrial sheet-making device. The control system comprises a scanned product under manufacture, a moving scanner head with a plurality of sensing devices, each sensing device includes a receiver and a transmitter and a scanner frame which controls and limits motion of the moving scanner head, the scanner frame includes a plurality of receivers and transmitters. Each receiver and transmitter is positioned along the scanner frame such that each receiver and transmitter are capable of aligning with the transmitter and receiver in said sensor, respectively, when the moving scanner head moves proximate to each of the receivers on the scanner frame. The sensor acquires data regarding the scanned products as the moving head moves along the frame over the scanned product. The sensor transmits the acquired data to the scanner frame when the transmitter in the sensor aligns with one of the receivers in the scanner frame. The acquired data is then transmitted to a central collection device for processing.

[0017] The scanner frame transmits control information to the moving scanner head when one of the at least one transmitters in the scanner frame is aligned with one of the receivers in the moving scanner head. This transmission will occur simultaneously to the transmission of the acquired sensing data from the moving scanner head. The moving scanner head adjusts its operation based upon the received control information.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] These and other features, benefits and advantages of the present invention will become apparent by reference to the following text and figures, with like reference numbers referring to like elements across the views, wherein:

Figure 1 illustrates a communications system according to a first embodiment of the invention;

Figure 2 illustrates a micro RF data transfer link according to one embodiment of the invention;

Figure 3 illustrates a portion of the controller for the moving device's transmitter and data acquisition section according to one embodiment of the invention;

Figure 4 illustrates a communications system according to a second embodiment of the invention;

Figure 5 illustrates a side view of a scanner device that is implementing the communications system, according to the second embodiment of the invention, as a control system; and

Figure 6 illustrates a top view of the scanner device.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Figure 1 illustrates a micro range RF communications system according to one embodiment of the invention. As depicted in Figure 1, the system includes a moving device 100 and a path of motion 110 for the moving device with a communication access point. The path of motion 110 is fixed and known. For example, the path of motion 110 can be a device frame, a track, a guide or a rail. The moving device 100 can move in any direction along the path of motion 110. For example, the moving device 100 can move from a front end point 111 to a back end point 112, and vice versa.

[0020] The moving device 100 will include a transmitter 105. The transmitter 105 will be a micro range transmitter capable of transmitting data only over a very short distance. The transmission range is a predetermined value the can be set based upon external environmental conditions and specific uses for the system. In one embodiment, the transmission range is between 1-5 mm.

[0021] The path of motion 110 will include at least one receiver 115 positioned along the path of motion 110. In one embodiment, a plurality of receivers 115 are positioned or distributed along the path of motion 115. The plurality of receivers 115 can be positioned such that each receiver 115 is equidistant from each other. The receivers 115 act as an access point for data transmission. While Figure 1 illustrates only one receiver 115, any number of micro range receivers 115 can be positioned along the path of motion 110.

[0022] As the moving device 100 moves along the fixed path of motion 110, the transmitter 105 will align with the receiver 115 that is positioned along the path of both. The location of both the receiver 115 and the transmitter 105 within the moving device and path of motion, respectively, is such that the receiver 115 and transmitter 105 can align with each other when the moving device approaches or is proximately to said receiver 115. When the transmitter 105 aligns with the receiver 115, an RF data transfer point 125 is formed.

[0023] In a preferred embodiment, data is transferred from the transmitter 105 to the receiver 115 only when they are aligned or in a predetermined proximate distance from each other.

[0024] Figure 2 illustrates an RF data transfer point 125 according to one embodiment of the invention. The data transfer point 125 includes a receiver 115 and a transmitter 105 that is aligned with the receiver 115. The receiver 115 includes an electromagnetic shield 200 formed around the circumference or perimeter of the receiver 115. In one embodiment, the receiver 115 is a

round or elliptical metallic object. In another embodiment, the receiver is a rectangular metallic object. Alternatively, the receiver 115 can be any shape capable of focusing or receiving RF signals. However, no matter what the shape of the receiver 115 is, the electromagnetic shield 200 will be formed around the perimeter of the receiver 115.

[0025] The electromagnetic shield 200 forms a chamber for the RF data transfer point 125. The electromagnetic shield 200 in effect channels directional transmission of the data from the transmitter 105 to the receiver 115. The electromagnetic shield 200 further isolates the RF data transfer point 125 from any noise or interference that could occur due to other radio signals and devices within the transmission environment. Additionally, the electromagnetic shield 200 isolates the RF data transfer point 125 from other data transfer points 125 within the system. As depicted in Figure 2, the distance between the moving device's transmitter 105 and the receiver 115 is between 1-5 mm. In a preferred embodiment, the electromagnetic shield 200 is positioned and dimensioned to cover substantially the entire distance between the transmitter 105 and the receiver 115. The only limitation to the dimension of the electromagnetic shield 200 is that the electromagnetic shield 200 must not interfere with the motion of the moving device 100. The electromagnetic shield 200 can be constructed for fabricated from any material that blocks any RF signal.

[0026] In a preferred embodiment, the diameter of the receiver 115 is larger than the diameter of the transmitter 105. This is to ensure that the entire transmitter can be within the enclosed shielded chamber when transmitting the signal and to allow for the entire packet to be transmitting when the transmitter is completely enclosed. The entire surface of the smaller transmitter will be able to travel within the shielded chamber for a time long enough to transmit all of the data. This larger diameter will prevent data from being transmitted to the outside that might have occurred due to constant motion of the device and that the time it takes for the data transmission to occur is greater than zero. The actual diameter or length of the transmitters 105 and receivers 115 will vary based upon external environment conditions and specific uses for the system. Additionally, the diameter or length will be determined based upon a rate of data transmission, size of the packet, and speed of the moving device 100.

[0027] Figure 3 illustrates a portion of the control section for the data acquisition and transmission section, the data acquisition section 315 and transmitter 105 for the moving device 100 according to one embodiment of the invention. The control section 300 will include a control system 305, a memory section 310, and an alignment sensor 320. As the moving device 100 moves along its fixed path of motion 110, the moving device 100 will acquire data via the data acquisition section 315. The data acquisition section 315 is controlled by the control system 305. The acquired data is stored in the memory section 310 for a short period of time. The period of time is determined by the speed of the moving device 100 and distance to the next RF data transfer point 125, since the transmitter 105 only transmits the data when the transmitter 105 is aligned with the receiver 115.

[0028] The alignment sensor 320 is used to detect when the transmitter 105 is aligned with the receiver 115. In one embodiment, the receiver 115 will include a permanent magnetic embedded, implanted or attached to it. The transmitter 105 will include a magnetic field sensor, which will output signal when the permanent magnetic is aligned with the magnetic field sensor. The output signal can be a logic signal. The logic signal will be used to drive the transmitter 105. In another embodiment of the invention, the receiver 115 can include a channeled light source, e.g., laser and the transmitter 105 can include a light detector. The light detected will output a signal when the light is detected, e.g., logic signal, the signal will be used to drive the transmitter 105. If alignment sensor 320 determines that the transmitter 105 is aligned with the receiver 115 it will allow the transmitter 105 to transmit the data. All of the acquired data that was stored in the memory section 310 will be transmitted in a bulk transmission, i.e., a periodic dump. Alternatively, if the alignment sensor 320 determines that the transmitter 105 is not aligned with the receiver, then the acquired data will not be transmitted; the acquired data will be stored in the memory section 310.

[0029] Figure 4 illustrates a second embodiment of the invention. According to the second embodiment of the invention, a first and second RF data transfer point is used to effect a bi-directional communication between the moving device 100 and the path of motion 110 as opposed to the unidirectional transmission, as depicted in Figure 1.

[0030] According to the second embodiment, the moving device 100 includes both at least one transmitter 405 and at least one receiver 410. The at least one transmitter 405 and at least one receiver 410 is positioned within the moving device 100 to align with a receiver and transmitter, respectively, located on the path of motion 110, as will be described later.

[0031] Similar to receiver 115, each receiver 410 will have an electromagnetic shield 200 formed at the perimeter or circumference of the receiver 410. The electromagnetic shield 200 is similar to the electro-magnetic shield 200 as set forth above with respect to the first embodiment and, therefore, will not be described again. The path of motion 110 includes at least one transmitter 425 and receiver 430. All receivers 430 will include the electro-magnetic shield 200. Each receiver 430 and transmitter 425 combination creates a transmission pair 435 and is positioned proximate to each other to facilitate simultaneous transmission with the receiver 410 and the transmitter 405. Each transmission pair 435 is positioned along the path of motion 110 such that the pair can be simultaneously aligned with the moving device's receiver 410 and transmitter 405. When the moving device's receiver 410 and transmitter 405 are aligned with or in a

defined proximate distance with the transmission pair 435, a first and second data transfer point 440 and 450 is established. Transmitter 405 and receiver 430 form the first data transfer point 440. The first data transfer point 440 is similar to the data transfer point 125 (Figure 2) and facilitates data transmission from the moving device 100 to the path of motion 110.

[0032] The second data transfer point 450 is formed from receiver 410 and transmitter 425. The second data transfer point 450 facilitates data transmission from the path of motion 110 to the moving device 100. This is particularly useful to transmit control information to the moving device.

[0033] Similar to the first embodiment, the moving device will only transmit a signal when the transmitter 405 is aligned with the receiver 430. However, in the second embodiment, there is a simultaneous bi-directional transmission between the moving device 100 and the path of motion 110 using the first and second data transfer points 440 and 450. Each data transfer point (440 and 450) facilitates one direction of the bi-directional data transfer.

[0034] Figures 5 and 6 illustrate an example of the micro range RF communication link according to the second embodiment of the invention to transmit sensor data and control messages to and from a scanner device.

[0035] Figure 5 illustrates a side view of an industrial scanning device 500 having a plurality of micro range RF communication links. Figure 6 illustrates a top view of the scanner frame 510 and scanning head 505.

[0036] In industrial processing, a plurality of scanning devices 500 is used to measure properties of a manufactured product. These scanning devices 500 are particularly used in the sheet making industry. A sheet making machine such as a paper making machine uses the plurality of scanning devices 500 distributed along the web of the paper to measure and acquire data about the various properties of the paper web under manufacture. These measured properties are transmitted to a central collection device where processing and control parameters are fedback to a plurality of actuators that control the manufacturing process. Additionally, control parameters are also fedback to the scanning device 500. The scanning devices 500 are arranged or positioned along the assembly line that extends from a stock tank containing raw stock to a reel of finished paper products.

[0037] The scanning device 500 includes a moving scanning head 505 and a fixed scanner frame 510. The scanning head 505 includes a plurality of sensing devices 506. The sensing devices are used to acquire data from a scanned product 550. Each of the plurality of sensing devices 506 includes a sensor transmitter 507 and receiver 508, as depicted in Figure 6. The scanning head 505 is capable of moving in multiple directions; however, its range of motion is fixed and governed by the scanner frame 510. Typically, the scanner head 505 will move in a linear direction across the scanned product 550 and acquired data regarding the scanned product 550 as the scanner head 505 moves across the scanned product 550.

[0038] The scanner frame 505 includes a plurality of transmission pairs 435 distributed along the scanner frame 505. As depicted in Figure 6, each transmission pair 435 includes a frame transmitter 515 and a frame receiver 516.

[0039] As the scanning head 505 moves along the scanning product 550, each sensor 506 acquires data and briefly stores the data in memory. The accumulated data is transmitted from the sensors 506 to the scanner frame 510 when its transmitter 507 is aligned with the frame receivers 516. Each data transfer point has an alignment sensor that detects alignment.

[0040] All of the frame receivers 516 are connected to a central collection device via a network. The frame receivers 516 will periodically transmits the acquired data from the sensors 505 to the central collection device. The central collection device will store and process the acquired data and transmit control parameters to the scanner frame 510. The frame transmitters 515 will transmit these control parameters to the sensors 506 using one of the data transfer points.

[0041] When one of the alignment sensors detects alignment between one of the sensor transmitters 507 and frame receivers 516 or between one of the sensor receivers 508 and the frame transmitter 515, there will be simultaneous transmission of data to and from the sensors 506 and the fixed scanner frame 510. In one direction, the sensors 506 will transmit, using the sensor transmitter 507 the acquired data to the fixed scanner frame, in the other direction, the fixed scanner frame 510, using the frame transmitter 515, will transmit control data to the sensing devices.

[0042] The above description and drawings are given to illustrate and provide examples of various aspects of the invention, and is not intended to limit the invention to the examples or illustrations. Given the benefit of the above disclosure, those skilled in the art may be able to devise various modifications and alternate constructions that, although differing from the examples disclosed herein, nevertheless enjoy the benefits of the invention and fall within the scope of the invention, which is defined by the following claims.

Claims

1. A control system used for controlling an industrial sheet making device comprising:

a scanned sheet product under manufacture (550);

a moving scanner head (505) with a plurality of sensing devices (506) that are adapted to measure properties of the sheet product, each sensing device (506) includes a sensor receiver (508) and a sensor transmitter (507);

a scanner frame (510) which is adapted to con-

trol and limit the motion of the moving scanner head (505), said scanner frame (510) includes a plurality of frame receivers (516) and frame transmitters (515) positioned along the scanner frame (510) such that at least one frame receiver (516) and at least one frame transmitter (515) align with at least one sensor transmitter (507) and at least one sensor receiver (508), respectively, in at least one of said plurality of sensing devices (506), when said moving scanner head (505) moves proximate to one of the plurality of frame receivers (516) wherein said plurality of sensing devices (506) are adapted to acquire data, regarding measured properties of the scanned sheet product (550) as the moving head (505) moves along the frame (510) over the scanned sheet product (550) and are adapted to transmit the acquired data to said scanner frame (510) when at least one of said sensor transmitters (507) aligns with at least one of said frame receivers (516) and
a central collection device adapted to receive and process the acquired data, wherein each of said sensor transmitters (507) is adapted to transmit a micro range signal to one of said frame receivers (516), wherein the signal has a transmission range of between 1 to 5 mm, wherein each of said frame transmitters (515) is adapted to transmit a micro range signal to one of the sensor receivers (508), wherein the signal has a transmission range of between 1 to 5 mm, wherein each of said frame receivers (516) includes an electromagnetic shield (200), formed around a perimeter of the frame receiver (516), which acts as a chamber that channels micro range signals from a sensor transmitter (507) to said frame receiver (516) when each of the sensor transmitters (507) in each of said plurality of sensing devices (506) is at a data transfer point (125, 440) to avoid interference and wherein each sensor receiver (508) includes an electromagnetic shield (200), formed around a perimeter of said sensor receiver (508), which acts as a chamber that channels micro range signals from a frame transmitter (515) to said sensor receiver (508) when each of the frame transmitters (515) on the scanner frame (510) is at a data transfer point (125, 440) to avoid interference.

2. The control system according to Claim 1, wherein said scanner frame (510) is adapted to transmit control information to said moving scanner head (505) when one of said at least one frame transmitters (515) in said scanner frame (510) is aligned with one of said sensor receivers (508) in said moving scanner head (505), said moving scanner head (505) being adapted to adjust its operation based upon the received control information.

3. The control system according to Claim 2, adapted to transmit the acquired data to said scanner frame (510) and the control information to said moving scanning head (505) simultaneously.

4. The control system according to any of Claims 1 to 3, wherein each sensor transmitter (507) has a corresponding control section that includes an alignment sensor (320), said alignment sensor (320) senses when one of said sensor transmitters (507) in said moving head (505) is proximate to one of said frame receivers (516), said alignment sensor (320) outputs a control signal that allows each sensor transmitter (507) to transmit the acquired data.

5. The control system according to any of Claims 1 to 5, wherein each frame transmitter (515) has a corresponding control section that includes an alignment sensor (320), said alignment sensor (320) senses when one of said frame transmitters (515) in said sensing frame (510) is proximate to one of said frame receivers (508) in said moving head (505), said alignment sensor (320) outputs a control signal that allows each frame transmitter (515) to transmit control information.

6. The control system according to any of Claims 1 to 5, wherein each sensor receiver (508) is larger than the frame transmitter (515) to which it is aligned so that the entire frame transmitter (515) is within the enclosed shielded chamber formed around the perimeter of the sensor receiver (508) and each frame receiver (516) is larger than the sensor transmitter (507) to which it is aligned so that the entire sensor transmitter (507) is within the enclosed shielded chamber formed around the perimeter of the frame receiver (516).

7. The control system according to any of Claims 1 to 6, wherein each electromagnetic shield (200) is fabricated from a material that blocks RF signals.

8. The control system according to any of Claims 1 to 7, wherein each electromagnetic shield (200) that is formed around the perimeter of a frame receiver (516) or that is formed around the perimeter of a sensor receiver (508) eliminates any interference caused by overlapping radio signals.

Patentansprüche

1. Steuersystem, das verwendet wird, um eine industrielle Blattherstellungsvorrichtung zu steuern, und das umfasst:

ein abgetastetes Blattprodukt bei der Fertigung (550);

einen beweglichen Abtastkopf (505) mit mehreren Sensorvorrichtungen (506), die dazu ausgelegt sind, die Eigenschaften des Blattprodukts zu messen, wobei jede Sensorvorrichtung (506) einen Sensorempfänger (508) und einen Sensorsender (507) umfasst;

einen Abtastrahmen (510), der dazu ausgelegt ist, die Bewegung des beweglichen Abtastkopfs (505) zu steuern und zu begrenzen, wobei der Abtastrahmen (510) mehrere Rahmenempfänger (516) und Rahmensender (515) entlang der Abtastrahmens (510) aufweist, so dass sich mindestens ein Rahmenempfänger (516) und mindestens ein Rahmensender (515) jeweils auf mindestens einen Sensorsender (507) bzw. mindestens einen Sensorempfänger (508) in mindestens einer der mehreren Sensorvorrichtungen (506) ausrichten, wenn sich der bewegliche Abtastkopf (505) in der Nähe eines der Rahmenempfänger (516) bewegt, wobei die mehreren Sensorvorrichtungen (506) dazu ausgelegt sind, Daten in Bezug auf die gemessenen Eigenschaften der abgetasteten Blattprodukte (550) zu erhalten, während sich der bewegliche Kopf (505) entlang des Rahmens (510) über das abgetastete Blattprodukt (550) bewegt und dazu ausgelegt sind, die erhaltenen Daten an den Abtastrahmen (510) zu übertragen, wenn sich mindestens einer der Sensorsender (507) auf mindestens einen der Rahmenempfänger (516) ausrichtet und

eine zentrale Sammelvorrichtung, die dazu ausgelegt ist, die erhaltenen Daten zu empfangen und zu verarbeiten, wobei jeder der Sensorsender (507) dazu ausgelegt ist, ein Mikrobereichssignal an einen der Rahmenempfänger (516) zu übertragen, wobei das Signal eine Übertragungsreichweite von 1 bis 5 mm besitzt, wobei jeder der Rahmensender (515) dazu ausgelegt ist, ein Mikrobereichssignal an einen der Sensorempfänger (508) zu übertragen, wobei das Signal eine Übertragungsreichweite von 1 bis 5 mm besitzt, wobei jeder der Rahmenempfänger (516) eine elektromagnetische Abschirmung (200) aufweist, die um einen Umfang des Rahmenempfängers (516) ausgebildet ist und die als eine Kammer agiert, die die Mikrobereichssignale von einem Sensorsender (507) an den Rahmenempfänger (516) kanalisiert, wenn jeder der Sensorsender (507) in jeder der mehreren Sensorvorrichtungen (506) an einem Datenübertragungspunkt (125, 440) ist, um Interferenzen zu vermeiden, und wobei jeder Sensorempfänger (508) eine elektromagnetische Abschirmung (200) aufweist, die um einen Umfang des Sensorempfängers (508) ausgebildet ist und die als eine Kammer agiert, die die Mikrobereichssignale von einem Rahmensender (515) an den Sensorempfänger (508) kanalisiert, wenn sich jeder der Rahmensender (515) auf dem Abtastrahmen (510) an einem Datenübertragungspunkt (125, 440) befindet, um Interferenzen zu vermeiden.

2. Steuersystem nach Anspruch 1, wobei der Abtastrahmen (510) Steuerinformationen an den beweglichen Abtastkopf (505) überträgt, wenn einer der Rahmensender (515) in dem Abtastrahmen (510) auf einen der Sensorempfänger (508) in dem beweglichen Abtastkopf (505) ausgerichtet ist, wobei der bewegliche Abtastkopf (505) dazu ausgelegt ist, seinen Betrieb auf der Basis der empfangenen Steuerinformationen anzupassen.

3. Steuersystem nach Anspruch 2, das dazu ausgelegt ist, gleichzeitig die erhaltenen Daten an den Abtastrahmen (510) und die Steuerinformationen an den beweglichen Abtastkopf (505) zu übertragen.

4. Steuersystem nach einem der Ansprüche 1 bis 3, wobei jeder Sensorsender (507) einen entsprechenden Steuerabschnitt besitzt, der einen Ausrichtungssensor (320) aufweist, wobei der Ausrichtungssensor (320) erfasst, wenn sich einer der Sensorsender (507) in dem beweglichen Kopf (505) in der Nähe eines der Rahmenempfänger (516) befindet, wobei der Ausrichtungssensor (320) ein Steuersignal ausgibt, das zulässt, das jeder Sensorsender (507) die erhaltenen Informationen überträgt.

5. Steuersystem nach einem der Ansprüche 1 bis 5, wobei jeder Rahmensender (515) einen entsprechenden Steuerabschnitt besitzt, der einen Ausrichtungssensor (320) aufweist, wobei der Ausrichtungssensor (320) erfasst, wenn sich einer der Rahmensender (515) in dem Abtastrahmen (510) in der Nähe eines der Sensorempfänger (508) in dem beweglichen Kopf (505) befindet, wobei der Ausrichtungssensor (320) ein Steuersignal ausgibt, das zulässt, das jeder Rahmensender (515) Steuerinformationen überträgt.

6. Steuersystem nach einem der Ansprüche 1 bis 5, wobei jeder Sensorempfänger (508) größer als der Rahmensender (515) ist, auf den er ausgerichtet ist, so dass sich der gesamte Rahmensender (515) innerhalb einer eingeschlossenen abgeschirmten Kammer befindet, die um den Umfang des Sensorempfängers (508) ausgebildet ist, und jeder Rahmenempfänger (516) größer als der Sensorsender (507) ist, auf den er ausgerichtet ist, so dass sich der gesamte Sensorsender (507) innerhalb einer eingeschlossenen abgeschirmten Kammer befindet, die um den Umfang des Rahmenempfängers

(516) ausgebildet ist.

7. Steuersystem nach einem der Ansprüche 1 bis 6, wobei jede elektromagnetische Abschirmung (200) aus einem Material hergestellt ist, das HF-Signale blockiert.

8. Steuersystem nach einem der Ansprüche 1 bis 7, wobei jede elektromagnetische Abschirmung (200), die um den Umfang eines Rahmenempfängers (516) oder um den Umfang eines Sensorempfängers (508) ausgebildet ist, jegliche Interferenzen, die durch überlappende Funksignale entstehen, beseitigt.

Revendications

1. Système de commande servant à commander un dispositif de fabrication industrielle de feuilles, comprenant :

un produit feuille scanné en cours de fabrication (550) ;
une tête de scanner mobile (505) dotée d'une pluralité de dispositifs capteurs (506) adaptés à mesurer des propriétés du produit feuille, chaque dispositif capteur (506) comportant un récepteur de capteur (508) et un émetteur de capteur (507) ;
un châssis de scanner (510) adapté à commander et limiter le mouvement de la tête de scanner mobile (505), ledit châssis de scanner (510) comportant une pluralité de récepteurs de châssis (516) et d'émetteurs de châssis (515) placés le long du châssis de scanner (510) de sorte qu'au moins un récepteur de châssis (516) et au moins un émetteur de châssis (515) s'alignent respectivement avec au moins un émetteur de capteur (507) et au moins un récepteur de capteur (508) dans au moins un de ladite pluralité de dispositifs capteurs (506), lorsque ladite tête de scanner mobile (505) se déplace à proximité d'un de la pluralité de récepteurs de châssis (516), ladite pluralité de dispositifs capteurs (506) étant adaptés à acquérir des données relatives à des propriétés mesurées du produit feuille scanné (550) à mesure que la tête mobile (505) se déplace le long du châssis (510) par-dessus le produit feuille scanné (550) et adaptés à transmettre les données acquises audit châssis de scanner (510) lorsqu'au moins un desdits émetteurs de capteur (507) s'aligne avec au moins un desdits récepteurs de châssis (516), et
un dispositif central de collecte adapté à recevoir et à traiter les données acquises, chacun desdits émetteurs de capteur (507) étant adapté à émettre un signal à très faible portée à destination d'un desdits récepteurs de châssis (516), le signal ayant une portée d'émission comprise entre 1 et 5 mm, chacun desdits émetteurs de châssis (515) étant adapté à émettre un signal à très faible portée à destination d'un des récepteurs de capteur (508), le signal ayant une portée d'émission comprise entre 1 et 5 mm, chacun desdits récepteurs de châssis (516) comportant un blindage électromagnétique (200), formé sur un périmètre du récepteur de châssis (516), constituant une chambre qui dirige des signaux à très faible portée d'un émetteur de capteur (507) audit récepteur de châssis (516) lorsque chacun des émetteurs de capteur (507) dans chacun de ladite pluralité de dispositifs capteurs (506) se situe à un point de transfert de données (125, 440) de façon à empêcher tout parasitage, et chaque récepteur de capteur (508) comportant un blindage électromagnétique (200), formé sur un périmètre dudit récepteur de capteur (508), constituant une chambre qui dirige des signaux à très faible portée d'un émetteur de châssis (515) audit récepteur de capteur (508) lorsque chacun des émetteurs de châssis (515) sur le châssis de scanner (510) se situe à un point de transfert de données (125, 440) de façon à empêcher tout parasitage.

2. Système de commande selon la revendication 1, dans lequel ledit châssis de scanner (510) est adapté à transmettre des informations de commande à ladite tête de scanner mobile (505) lorsqu'un desdits émetteurs de châssis (515) dans ledit châssis de scanner (510) s'aligne avec un desdits récepteurs de capteur (508) dans ladite tête de scanner mobile (505), ladite tête de scanner mobile (505) étant adaptée à ajuster son fonctionnement en fonction des informations de commande reçues.

3. Système de commande selon la revendication 2, adapté à transmettre les données acquises audit châssis de scanner (510) et les informations de commande à ladite tête de scanner mobile (505) de façon simultanée.

4. Système de commande selon l'une quelconque des revendications 1 à 3, dans lequel chaque émetteur de capteur (507) possède une partie de commande correspondante comportant un capteur d'alignement (320), ledit capteur d'alignement (320) détectant lorsqu'un desdits émetteurs de capteur (507) dans ladite tête mobile (505) se situe à proximité d'un desdits récepteurs de châssis (516), ledit capteur d'alignement (320) produisant un signal de commande permettant à chaque émetteur de capteur (507) de transmettre les données acquises.

5. Système de commande selon l'une quelconque des revendications 1 à 5, dans lequel chaque émetteur de châssis (515) possède une partie de commande correspondante comportant un capteur d'alignement (320), ledit capteur d'alignement (320) détectant lorsqu'un desdits émetteurs de châssis (515) dans ledit châssis de scanner (510) se situe à proximité d'un desdits récepteurs de capteur (508) dans ladite tête mobile (505), ledit capteur d'alignement (320) produisant un signal de commande permettant à chaque émetteur de châssis (515) de transmettre des informations de commande.

6. Système de commande selon l'une quelconque des revendications 1 à 5, dans lequel chaque récepteur de capteur (508) est plus grand que l'émetteur de châssis (515) avec lequel il s'aligne de sorte que l'émetteur de châssis (515) se trouve tout entier dans la chambre blindée close formée sur le périmètre du récepteur de capteur (508), et chaque récepteur de châssis (516) est plus grand que l'émetteur de capteur (507) avec lequel il s'aligne de sorte que l'émetteur de capteur (507) se trouve tout entier dans la chambre blindée close formée sur le périmètre du récepteur de châssis (516).

7. Système de commande selon l'une quelconque des revendications 1 à 6, dans lequel chaque blindage électromagnétique (200) est constitué d'un matériau qui bloque les signaux RF.

8. Système de commande selon l'une quelconque des revendications 1 à 7, dans lequel chaque blindage électromagnétique (200) formé sur le périmètre d'un récepteur de châssis (516) ou formé sur le périmètre d'un récepteur de capteur (508) supprime tout parasitage dû au chevauchement de signaux radioélectriques.

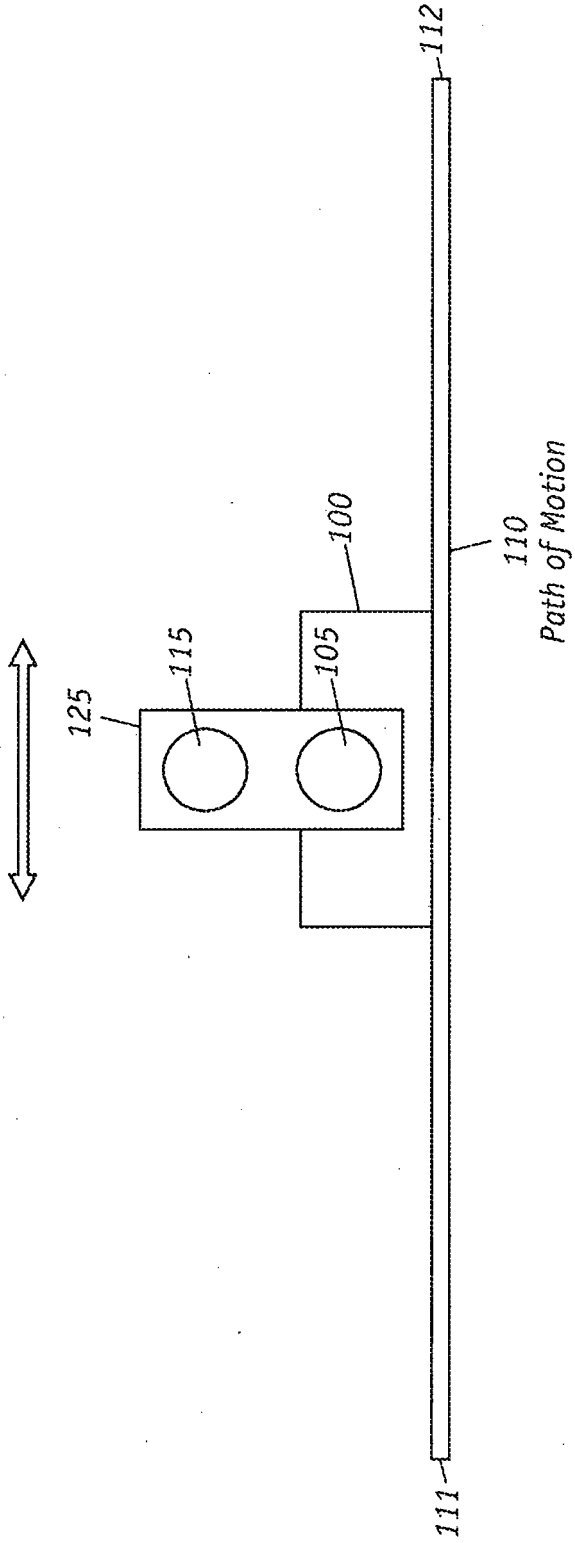

Figure 1

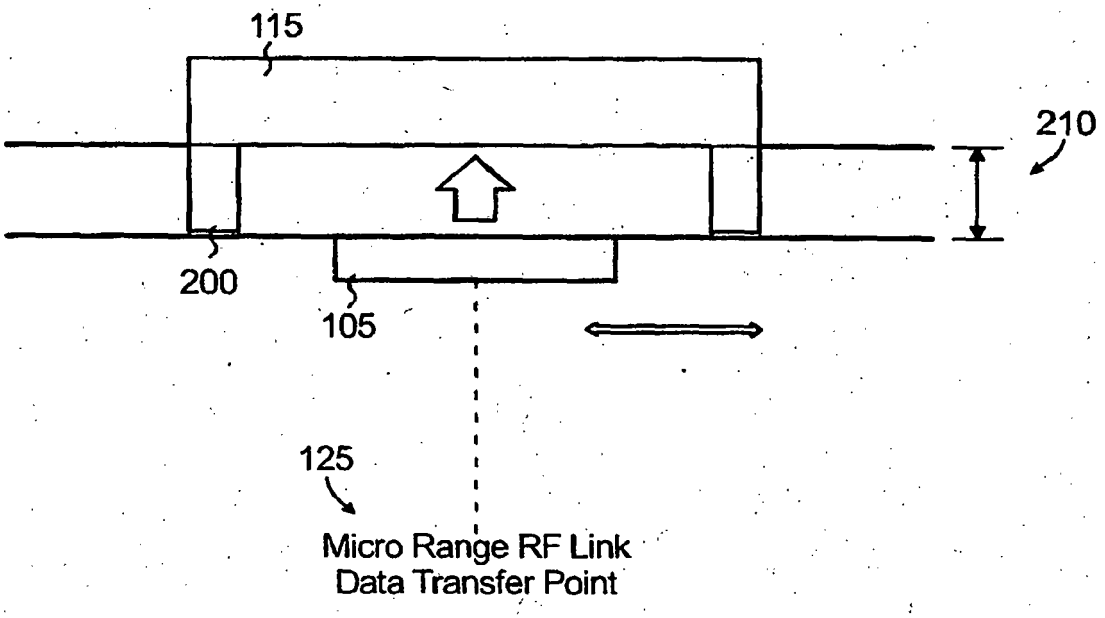

Figure 2

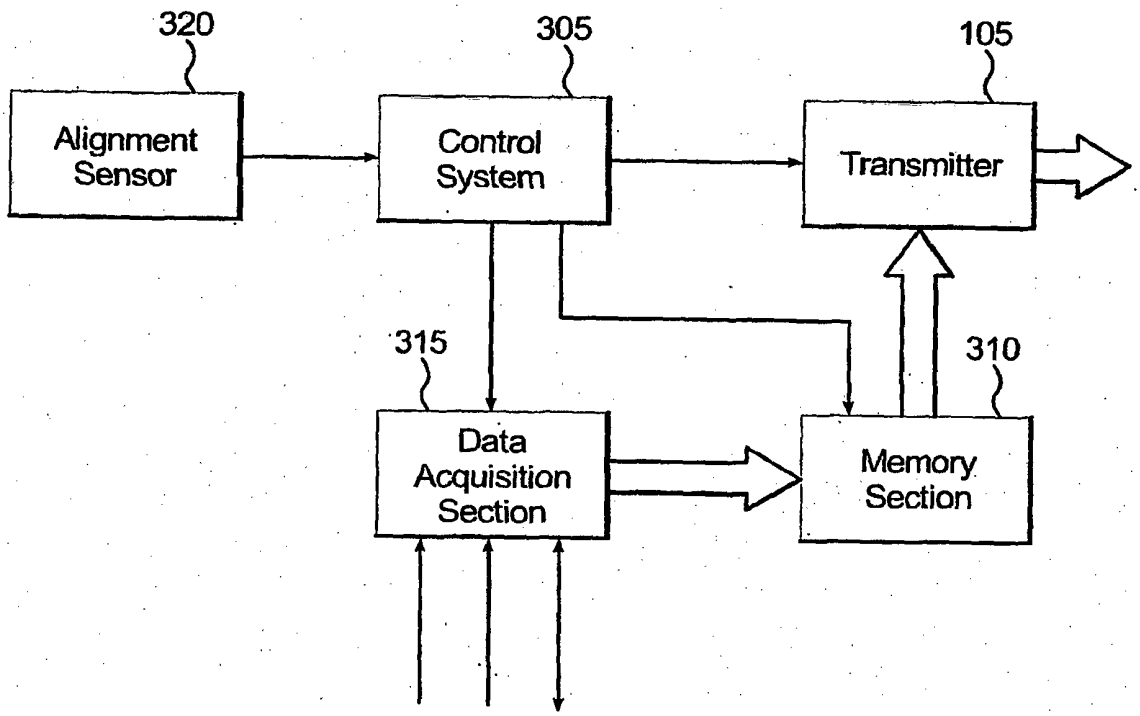
320
305
105
Alignment Sensor
Control System
Transmitter
315
310
Data Acquisition Section
Memory Section

Figure 3

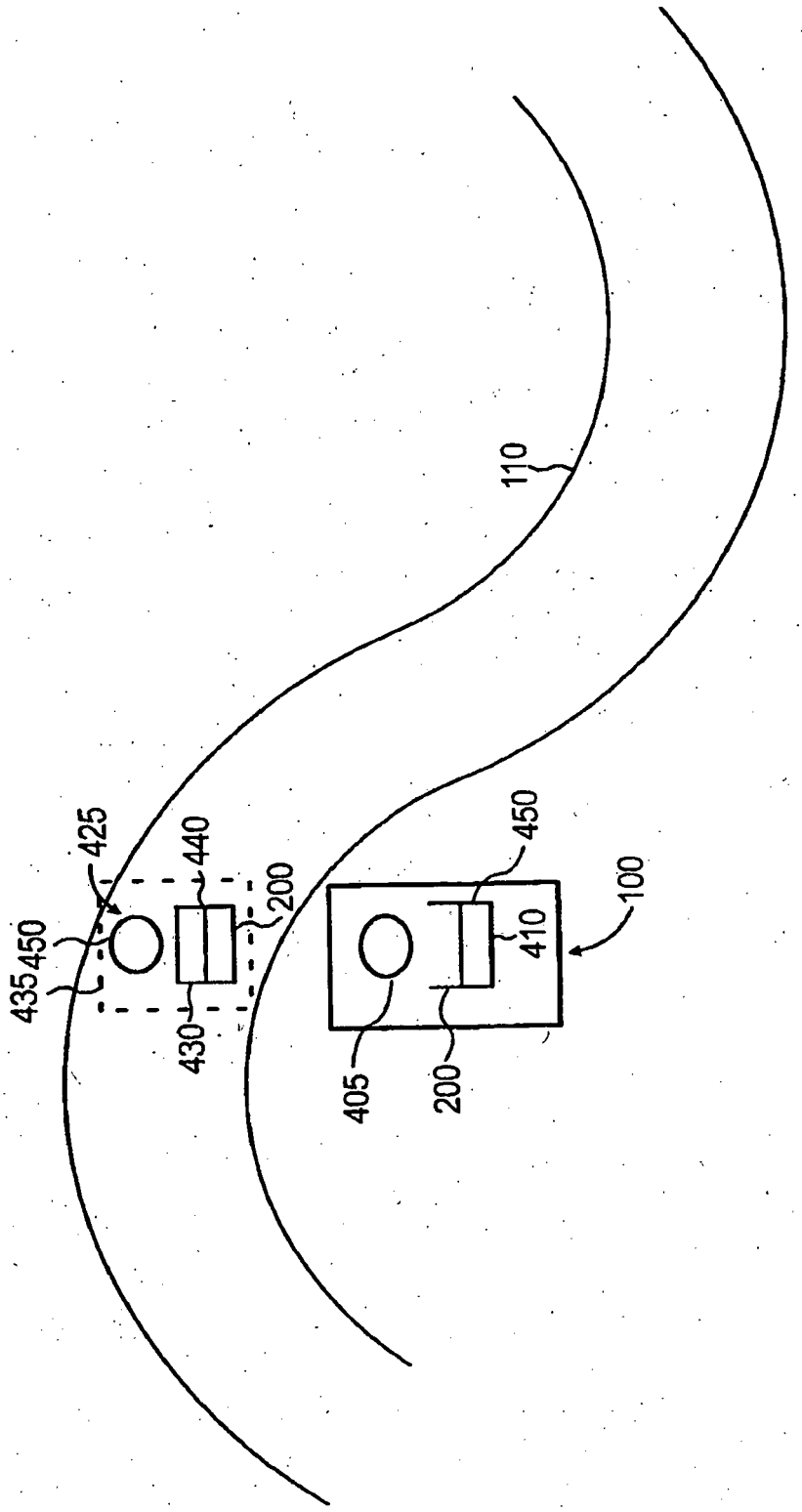

Figure 4

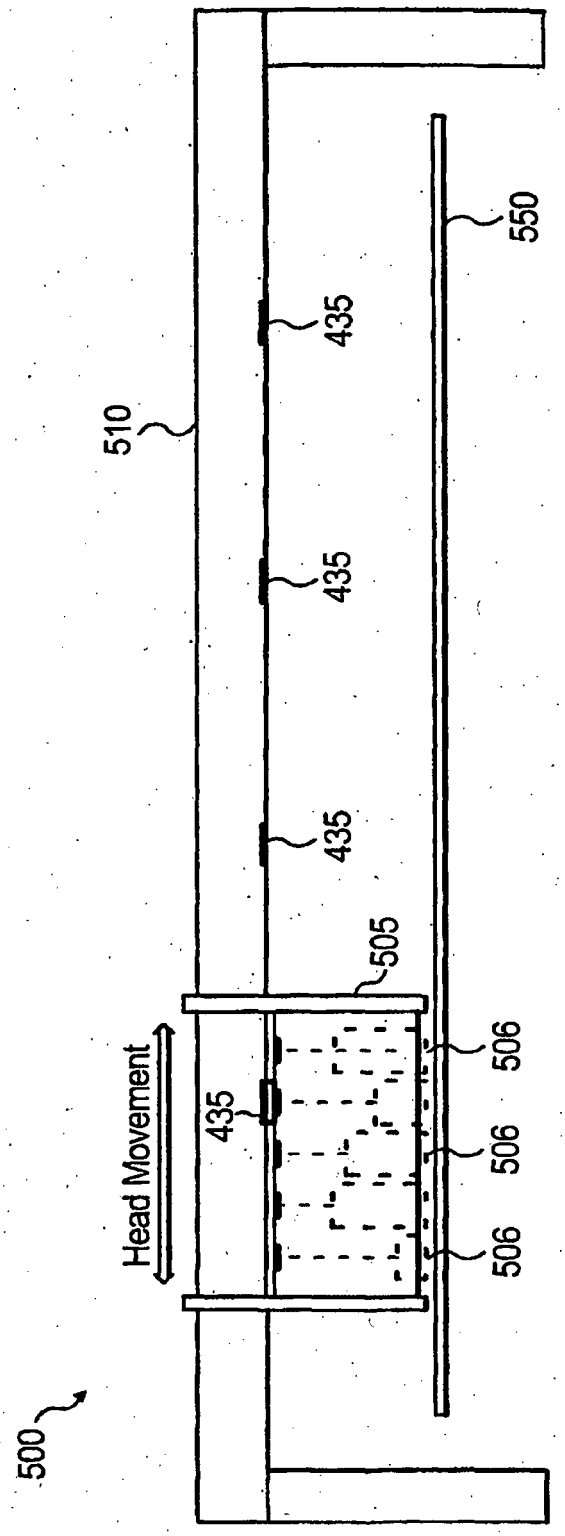

Figure 5

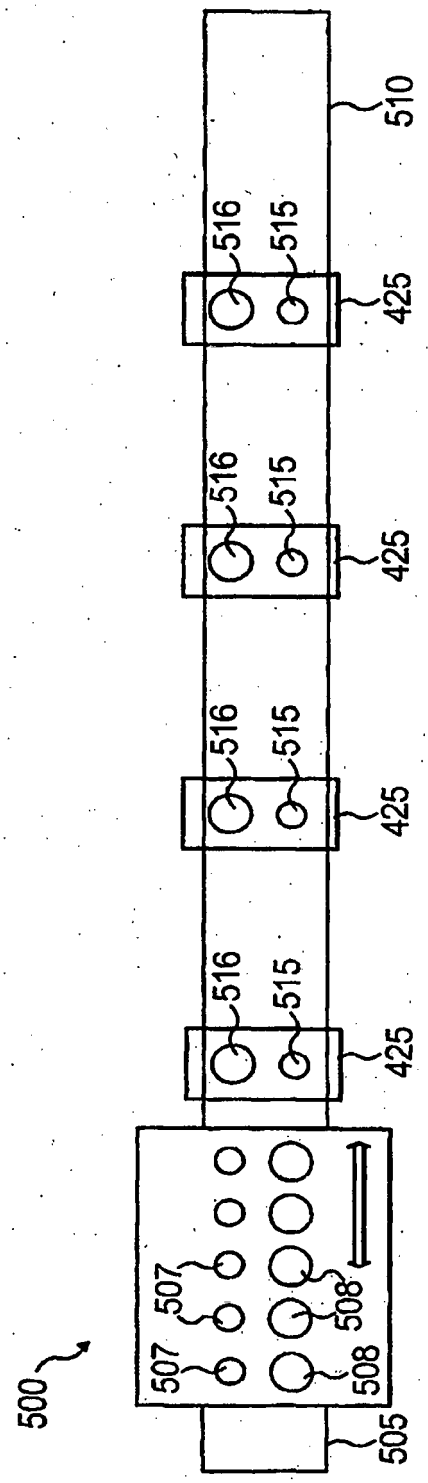
500
505
507
507
508
508
425
425
425
425
515
515
515
515
516
516
516
516
510

Figure 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- AU 677939 **[0007]**
- US 2002038267 A **[0007]**